

## IMMIGRATION OF *METAPENAEUS STEBBINGI*, *M. AFFINIS* AND *M. MONOCEROS* JUVENILES IN THE CREEKS AND BACKWATERS NEAR KARACHI

*Metapenaeus stebbingi*, *M. affinis* and *M. monoceros* inhabit the northern Arabian Sea and contribute significantly to the Pakistani fishery. The immigration and life cycles of these species were studied in four localities: Korangi Creek, Bham-bore Sandspit and Hab Delta during 1979. These are all muddy, mangrove areas near Karachi City, with a temperature range of 16°–33°C. Salinities were generally high during winter (December–January) and spring (37–39 ppt) due to the prolonged dry season. Lower salinities (29–30 ppt) in summer were caused by southwest monsoon rains and in winter due to the occasional northeast monsoon. The growth rates in the four species were determined by rearing these in the laboratory so as to know their age when caught.

*M. stebbingi* were caught round the year in Korangi Creek with a peak from July to September and secondary peaks during February–March and November (early winter), a July peak in Hab Delta and a November peak at Sandspit. In general larger 10–14 mm C.L. individuals were abundant during winter and smaller 3–9 mm during spring and summer. Recruitment generally occurred during late summer (July–October) and early winter (November–December). Juveniles of this species are abundant in areas where high salinity prevails, like Korangi Creek and Mekran coasts, but are insignificant in areas where there is great variations (0–40 ppt) as in the Indus Delta (Hassan, 1989). The species spawns throughout the year with a peak during May–July.

Peaks of abundance in *M. affinis* occur during summer at the four localities, with highest in Korangi Creek and lowest at Sandspit. Larger 8–12 mm were more frequent during winter (January–February) and late summer (September–October), and smaller 3–7 mm during spring (April) and summer. This species is less abundant in areas where high salinity prevails (30–36 ppt) but recorded in very large numbers further south in the Indus Delta where there are great variations in salinity (0–40 ppt, Hassan 1989). The species spawns throughout the year with peaks during February–March and recruitment generally occurring from April to July.

*M. monoceros* juveniles were present in the study area in smaller numbers than other species at the four localities, and only during April to October, with a peak during May–June. The species spawns from January to July with recruitment occurring during summer. It is typically abundant off the coast of Pakistan (Golobov and Grobov, 1969; Zupanovic, 1971). It seems that juveniles of this species prefer low or moderate salinities as George (1971) reported great abundance in low saline estuaries and paddy-fields in India.

A temporal partitioning is apparent between *M. affinis*, *M. monoceros* and *M. stebbingi* related to spawning cycles. In the former the spawning is in spring and in the latter summer. This is similar to *M. endeavaouri* and *M. dalli* in Dugong River (Coles and Long, 1985) and to *M. bennetiae* and *M. macleuyi* in Moreton Bay (Young, 1978; Dall, 1958).

### Life Cycle

*Metapenaeus* spawn at sea and enter the creeks and backwaters when 15–20 days old and 1 mm C.L. They continue to move to and fro with tidal currents and generally settle at one month old and 3 mm C.L. (Hassan, 1983, 1987b, 1989). Juveniles grow for about 4 months before migrating back to sea at 12–16 mm. Sub-adults spend about a month in the deeper waters of the same locality, or shallower shelf, and attain 20 mm. They continue to grow and mature as they spread into deeper waters and spawn when 7 months old (20–30 mm). However, the bulk of the cohort spawn at 30–35 mm C.L., when 10–12 months old (Zupanovic, 1971; Garcia, 1985).

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